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the male himself. This occurred five times in succession. At intervals the female struggled to rid herself of him but did not succeed. The sixth time that the globule appeared was immediately after one of these struggles; this time the globule was handed over but the male dismounted at once of his own accord and went off.

The habit itself is curious enough, but no less interesting are the variations noted and the decided imperfection of instinct in the male of pair number four. The apparent choice exerted by the female of pair number two, and the whole behavior of the pairs gave an impression that could not be harmonized with any theory of insect behavior that considered insects pure automata.

Another point of interest is the possible connection between these globules and those referred to by J. M. Aldrich and L. A. Turley in an article entitled "A balloon-making fly" (*Amer. Nat.*, 1899, vol. 33, pp. 809–812). The balloons are described as hollow, elliptical structures "composed entirely of a single layer of minute bubbles," and it is said that they are probably produced by the anal organs as in the leaf-hoppers "but no positive observations on this point could be made." The authors do not state plainly that the bubbles contain air; in the present case, however, there are certainly no bubbles, but solid droplets probably of salivary secretion.

The behavior of these flies suggests that of the pigeon as described by Dr. E. H. Harper (*Amer. Journ. of Anat.*, 1904, vol. 3, p. 354). He says,— "There is an act which regularly precedes copulation, in which there is an apparent regurgitation of some secretion by the male which is taken from his throat by the bill of the female, in somewhat the same manner as the young birds take their food. It is a less violent manifestation than the feeding of the young however. It is easy to see that here may be one of the sources of indirect stimulation to the female reproductive organs." (Compare with the stroking of the salamander recorded in the following note.)

Specimens of the fly were preserved and through the kindness of Dr. L. O. Howard, identified as *Rivellia boscii* (Desv.).

W. H. Piersol.

The Spermatophores of Salamandra.— In connection with Dr. Smith's account of the spermatophores of Amblystoma published in the last number of the *Naturalist*, the recent paper by W. Docters van Leeuwen is of special interest (Über die Aufnahme der Spermatophoren bei *Salamandra maculosa* Laur., *Zool. Anz.*, 1907, vol. 31, pp. 649–653). The animals observed were in confinement but the conditions were believed to be natural. At twilight the salamanders come out from the mossy logs, and the male having found a mate crawls under her body, working his way forward. His front legs are swung around those of the female and he strokes the under side of her head with his nose. After a time a spermatophore is deposited on the moss. It is a pyramidal structure 8–10 mm. high and 4–6 mm. wide, sharply pointed with the apex upward. After its deposition the male swings his body 90 degrees to one side, but retains his grasp, and his head remains beneath that of the female. The cloaca of the female is thus brought over the spermatophore which is taken up before the pair separates. Mating occurs from July to September or October, and the spermatophores are always deposited on land. The eggs are fertilized and in the following spring or early summer the young are laid. A new set of eggs is then mature and ready for fertilization.

F. T. L.

Stone-gathering Fishes. — In the *American Naturalist* for May (pages 323–327 of the current volume), Dr. Alfred W. G. Wilson has given important information and excellent illustrations of so-called "Chubs' Nests." Although, as stated in a foot-note, no account of these nests is included in my article on "Parental care among fresh water fishes," it is recorded (p. 436) that several American cyprinids "also take care of their eggs, especially the Horned Dace (*Semotilus atromaculatus*), the Black-headed Dace (*Pimephales promelas*), and the Stone-roller (*Campostoma anomalum*)." I did not give any further information for two reasons; the data in the books were unsatisfactory, and Professor Jacob Reighard had informed me that he would soon publish an account of the habits of these fishes.

The evidence as to the exact species that heaps the stones in question needs confirmation. Dr. C. C. Abbott, in "A naturalist's rambles about home" (1884, p. 408) positively declares that *Semotilus corporalis* (called by him *bullaris*) "differs materially from the birds and even many fish" in that "it does not concern itself with the care of its offspring. Once the eggs are laid upon their bed of sand, all care as to their future vanishes"; he says nothing about the oviposition of *Semotilus atromaculatus* noticed on page 409 and called by him *S. corporalis* (p. 479).

Semotilus atromaculatus occurs in Canada as well as *S. corporalis*; it is known not only as Dace but as Chub, both English terms being applied to this American fish which is no nearer one than the other.